



DOCKET NO: 218296US-2S CONT

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF

TOMOYUKI HATTORI ET AL. : EXAMINER: NGUYEN, HANH N.

SERIAL NO: 10/053,704 :

FILED: JANUARY 24, 2002 : GROUP ART UNIT: 2834

FOR: PERMANENT MAGNET TYPE
ELECTRIC MOTOR

REQUEST FOR RECONSIDERATION

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

SIR:

This communication is in response to the Official Action mailed September 4, 2003.

Remarks begin on page 2 of this paper.

REMARKS

Favorable reconsideration of this application in light of the following discussion is respectfully requested.

Claims 1-11 are pending in the present application. No claims have been added, amended or canceled by the present amendment.

In the outstanding Office Action, Claim 10 was rejected under 35 U.S.C. § 102(a) as unpatentable over Saki et al. in view of Wavre; and Claims 1-9 and 11 were allowed.

Applicants thank the Examiner for the indication of allowable subject matter.

Claim 10 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Saki et al. in view of Wavre. This rejection is respectfully traversed.

Claim 10 is directed to a permanent magnetic type reluctance electric motor in which the stator satisfies a relationship of:

$$0.45 \leq W_t / \tau \leq 0.8,$$

where τ (m) indicates the pitch of the slot and W_t (m) indicates the width of the teeth.

In a nonlimiting example, Figure 10 illustrates the width of the teeth and the pitch of the slot and Figure 11 illustrates the claimed range. The outstanding Office Action recognizes that Saki et al. do not teach or suggest the claimed range and relies on Wavre as teaching this feature. However, Applicants note Wavre relates to a motor in which the armature core includes opening slots, and is intended to reduce the reluctance force which may be caused by the slots and teeth. Figure 2 of Wavre illustrates how a permanent magnetic operates. As shown, the armature slots reduce the magnetic flux density of the air gap, causing torque pulsation. This torque is referred to as a “clogging torque” in the field of electrical apparatuses and is a retention torque in which the teeth (or slots) and the permanent magnets of the rotor produce when no current is supplied. When a forcible rotation is made by an external force or by using the torque of the motor, the rotation causes a slot ripple. The

slot ripple is referred to as a reluctance force in Wavre and is described as having adverse effects on the torque of the motor in column 1, lines 48-61 and column 2, lines 13-21.

Further, the apparatus in Wavre is intended to reduce the clogging torque, and the ratio of the tooth width to the tooth pitch (namely bn/tn is within the range of 0.4 to 0.55 (see lines 17-28 of column 4)). The reluctance effect caused by slots decreases to a value far smaller than the corresponding value of a conventional motor (see col. 4, lines 34-40).

As noted above, the object of Wavre is to reduce the reluctance force caused by slots. On the contrary, the object of the present invention is to increase the reluctance torque, which serves as a continuous propelling force to the motor. In other words, the reluctance force of Wavre serves as a pulsating force to the torque of the motor (the propelling force of the motor), while the reluctance torque of the claimed invention serves as a propelling force and increases the torque of the motor. In this way, the reluctance force of Wavre and the reluctance torque of the claimed invention acts in entirely different ways.

Further, in Wavre, a permanent magnet is arranged in the armature core and on a surface facing the armature core. Therefore, the reluctance force of Wavre is produced by the permanent magnets and the combination of the armature core and slots, and undergoes an alternately changing force, distributing the torque of the motor.

On the contrary, the claimed invention includes an armature core and a rotor that utilizes changes in reluctance. When current is supplied to the armature winding, and a rotating magnetic field is generated, the reluctance change of the rotor produces a reluctance torque serving as a propelling torque of the motor.

Accordingly, in light of the above comments, it is respectfully submitted independent Claim 10 is also allowable.

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Reply to Office Action of September 4, 2003

Consequently, in light of the above discussion, the present application is believed to be in condition for allowance and an early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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EXAMINER: NGUYEN, H. N.

FOR: PERMANENT MAGNET TYPE ELECTRIC MOTOR

LETTER SUBMITTING DRAWING SHEET(S)

COMMISSIONER FOR PATENTS

Alexandria, VA 22313

SIR:

Responsive to the below indicated communication, the following drawing sheets are submitted herewith:

2 Replacement Drawing Sheets 1 New Drawing Sheets

Official Action dated September 4, 2003

Notice of Allowance/Issue Fee dated _____

Other dated _____

The changes and/or modifications made include the following:

Figure 1 has been labeled "Prior Art" and Figure 6 has been amended to change the label "[min]" to "[mm]."

Respectfully submitted,

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Docket No.: 218296US-2S CONT

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COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

RE: Application Serial No.: 10/053,704

Applicants: Tomoyuki HATTORI et al.

Filing Date: JANUARY 24, 2002

For: PERMANENT MAGNET TYPE ELECTRIC MOTOR

Group Art Unit: 2834

Examiner: NGUYEN, H. N.

SIR:

Attached hereto for filing are the following papers:

**REQUEST FOR RECONSIDERATION
LETTER SUBMITTING DRAWING SHEET(S)
REPLACEMENT SHEETS (2)
NEW FIGURE 3B**

Our check in the amount of **\$0.00** is attached covering any required fees. In the event any variance exists between the amount enclosed and the Patent Office charges for filing the above-noted documents, including any fees required under 37 C.F.R. 1.136 for any necessary Extension of Time to make the filing of the attached documents timely, please charge or credit the difference to our Deposit Account No. 15-0030. Further, if these papers are not considered timely filed, then a petition is hereby made under 37 C.F.R. 1.136 for the necessary extension of time. A duplicate copy of this sheet is enclosed.

Respectfully submitted,

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